



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

*Am*

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/854,268	05/11/2001	Takakazu Shiomi	NAK1-BO82	8260

21611 7590 06/13/2005  
SNELL & WILMER LLP  
1920 MAIN STREET  
SUITE 1200  
IRVINE, CA 92614-7230

EXAMINER

ALI, SYED J

ART UNIT PAPER NUMBER

2195

DATE MAILED: 06/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/854,268

Applicant(s)

SHIOMI ET AL.

Examiner

Syed J. Ali

Art Unit

2195

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 58-92 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 58-66 and 70-92 is/are rejected.
- 7) ☒ Claim(s) 67-69 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 May 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

1. This office action is in response to the amendment filed March 31, 2005. Claims 58-92 are presented for examination.

2. The text of those sections of Title 35, U.S. code not included in this office action can be found in a prior office action.

***Claim Rejections - 35 USC § 103***

3. **Claims 58-66 and 70-92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bishop et al. (USPN 5,826,082) (hereinafter Bishop) in view of Lawrence (USPN 6,629,113).**

4. As per claim 58, Bishop teaches the invention as claimed, including an application execution apparatus including a plurality of devices, comprising:

a storing unit for storing a plurality of applications (Fig. 1 element 104);

a kernel unit for controlling execution of the plurality of applications in the storing unit (Fig. 1 element 110); and

a library unit for managing a device by executing a device control program (col. 2 lines 36-38; col. 3 lines 1-4);

wherein the library unit comprises:

Art Unit: 2195

resource providing means for, when an application being executed requests provision of a device (col. 3 lines 1-7), providing the device to the application as a resource (col. 3 lines 31-32), and registering a correspondence of the resource and the application provided with the resource into a table (col. 3 lines 37-40); and

the kernel unit includes:

application executing means for reading the plurality of applications in the storing unit and executing the plurality of applications (col. 2 lines 31-35).

5. Lawrence teaches the invention as claimed, wherein

the library unit comprises:

requesting means for, if the resource providing means provides the resource to the application, requesting the kernel unit to notify the library unit of completion of the application when the application is completed (col. 8 line 61 - col. 9 line 2; col. 10 lines 17-30); and

collecting means for, when the kernel unit notifies the library unit of the completion of the application in response to the request from the requesting means, specifying the resource corresponding to the application based on the table, and collecting the specified resource (col. 10 lines 17-30); and

the kernel unit comprises:

notifying means for, when the application being executed in completed, notifying the library unit which has requested the notification, of the completion of the application (col. 8 line 61 - col. 9 line 2; col. 10 lines 17-30).

6. It is noted that Bishop only discusses a single library unit, i.e. resource manager, for handling resources allocated to an application. However, this is an obvious modification as the

Art Unit: 2195

use of plural library units in a one-to-one relationship to devices is a well-known feature of the prior art, as it provides a simple modular way of handling all resources associated with a device. See Chang (USPN 6,286,025) (col. 3 lines 3-16, "In a manner well known in the prior art, each...device...is associated with a Resource Manager or Library Service, which is responsible for maintaining and updating all resource objects associated therewith.")

Bishop discusses at length a method of reserving and allocating resources to distinct threads by way of a reservation table and an in-use table. However, Bishop is silent regarding the reclamation of these resources or how a garbage collector should be notified that the resources are available for reclamation. As is well known in the art, garbage collection is an essential factor in resource allocation, as a system would have limited resources and the entire purpose of resource allocation is to ensure that an application has sufficient resources to complete its execution. Thus, it would have been obvious to one of ordinary skill in the art to combine Bishop and Lawrence, as Lawrence provides various methods of notifying the garbage collector of the completion of a task, so that the resources that had been allocated to the application are immediately reclaimed, and made available for another application.

7. As per claim 59, Lawrence teaches the invention as claimed, including the application execution apparatus of claim 58,

wherein the requesting means requests the notification, by registering a callback function into the notifying means (col. 8 line 61 - col. 9 line 2), and

the notifying means notifies the library unit of the completion of the application by calling and executing the registered callback function, when the application is completed (col. 10 lines 17-30).

8. As per claim 60, Bishop teaches the invention as claimed, including the application execution apparatus of claim 58,

the resource providing means generates, when the application being executed requests the provision of the device, a resource collection instance storing the table and a method of retrieving information from the table (col. 3 lines 36-40).

9. Lawrence teaches the invention as claimed,

wherein the notifying means generates an application information instance storing application information for identifying each application which is in execution (col. 10 lines 17-30),

the requesting means requests the notification, by registering the resource collection instance into an application information instance storing application information for identifying the application provided with the device as the resource (col. 8 line 61 - col. 9 line 2), and

the notifying means notifies the library unit of the completion of the application by calling the method in the resource collection instance registered in the application information instance by the requesting means, when the application is completed (col. 10 lines 17-30).

10. As per claim 61, Lawrence teaches the invention as claimed, including the application execution apparatus of claim 58,

Art Unit: 2195

wherein when at least two applications are completed at the same time, the notifying means notifies each library unit which has requested notification of completion of any of the applications, of the completion of the application (col. 10 lines 17-30), and

the collecting means specifies resources corresponding to the notified applications based on the table, and collects the specified resource (col. 8 line 61 - col. 9 line 2).

11. As per claim 62, Lawrence teaches the invention as claimed, including the application execution apparatus of claim 58,

wherein the requesting means further requests, if the resource providing means provides the resource to the application, the kernel unit to notify the library unit of suspension of the application when the application is suspended (col. 8 line 61 - col. 9 line 2; col. 10 lines 19-22),

the notifying means notifies, when the application is suspended, the library unit which has requested for the notification, of the suspension of the application (col. 10 lines 17-30), and

each library unit further includes:

judging means for judging whether the resource provided to the application should be collected, depending on whether the application has been completed or suspended (col. 8 line 61 - col. 9 line 2), and

the collecting means collects the resource, when the judging means judges that the resource should be collected (col. 8 line 61 - col. 9 line 2).

12. As per claim 63, Lawrence teaches the invention as claimed, including the application execution apparatus of claim 62,

wherein the notifying means generates an application information instance storing application information for identifying each application which is in execution (col. 8 line 61 - col. 9 line 2),

the resource providing means generates, when the application being executed requests the provision of the device, a resource collection instance storing the table and a method of retrieving information from the table (col. 8 line 61 - col. 9 line 2),

the requesting means requests the notifying means to notify the completion of the application and the suspension of the application, by registering the resource collection instance into an application information instance storing application information for identifying the application provided with the device as a resource (col. 8 line 61 - col. 9 line 2; col. 10 lines 19-22), and

the notifying means notifies the library unit of the completion of the application when the application is completed and the suspension of the application when the application is suspended, by calling the method in the resource collection instance registered in the application information instance by the requesting means (col. 10 lines 17-30).

13. As per claim 64, Bishop teaches the invention as claimed, including the application execution apparatus of claim 58, further comprising the kernel unit being a Java middleware unit, and an OS unit functioning as a library unit, the apparatus further comprising:

the Java middleware unit includes:



first table holding means for holding a first table which shows a correspondence between applications, tasks corresponding to the applications, and threads which make up each task (col. 2 lines 45-56);

first table renewing means for, when a thread is generated in response to a request from an application being executed, adding a correspondence between the generated thread, the application, and a task generated for the application to the first table to thereby renew the first table (col. 2 lines 57-64); and

the OS unit includes:

task generating means for generating the task for executing the application (col. 2 lines 45-56);

thread generating means for generating threads which make up the task generated by the task generating means (col. 2 lines 45-56); and

controlling means for executing the generated threads to execute program codes of the application (col. 2 lines 31-35).

14. As per claim 65, Lawrence teaches the invention as claimed, including the application execution apparatus of claim 64,

wherein the Java middleware unit further includes:

requesting means for requesting to notify the application which is being executed, of a change of status of a device (col. 8 line 61 - col. 9 line 2; col. 10 lines 17-30); and

status change notifying means for notifying the application of the change, upon detecting the change (col. 8 line 61 - col. 9 line 2; col. 10 lines 17-30).

15. As per claim 66, Lawrence teaches the invention as claimed, including the application execution apparatus of claim 65,

wherein the requesting means requests the status change notifying means to call a listener which waits to be informed of the change (col. 8 line 61 - col. 9 line 2; col. 10 lines 17-30), and

the status change notifying means makes the notification by calling the listener, upon detecting the change (col. 10 lines 17-30).

16. As per claim 70, Bishop teaches the invention as claimed, including the application execution apparatus of claim 64,

wherein the Java middleware unit further includes:

resource reserve thread generating means for generating a resource reserve thread for reserving resources necessary for the Java middleware unit (col. 3 lines 31-36); and

resource reserving means for reserving the resources necessary for the Java middleware unit, by executing the resource reserve thread (col. 3 lines 31-36), and

the collecting means specifies the resources corresponding the notified task based on the table in the controlling means, and collects the specified resources, without collecting the resources reserved by the resource reserving means (col. 3 lines 37-43).

17. As per claim 71, Lawrence teaches the invention as claimed, including the application execution apparatus of claim 58, wherein the kernel unit is a Java middleware unit (col. 5 lines 3-19).

18. As per claim 72, Bishop teaches the invention as claimed, including the application execution apparatus of claim 71,

wherein the notifying means includes:

loader specifying means for specifying a class loader that loaded the application which requests the resources (col. 3 lines 31-44);

table holding means for holding a table showing a correspondence between loaded applications and class loaders which loaded the applications (col. 2 lines 58-65); and

application specifying means for specifying the application corresponding to the specified class loader, based on the table in the table holding means (col. 2 lines 58-65).

19. As per claim 73, Bishop teaches the invention as claimed, including the application execution apparatus of claim 72,

wherein the loader specifying means specifies the class loader, by referencing a stack which stores information on a caller of a class of the application (col. 2 lines 45-65; Fig. 1 elements 115 and 140).

20. As per claims 74-76, Bishop teaches the invention as claimed, including the application execution apparatus of claim 73,

wherein the OS unit further includes:

assigning means for assigning an application ID to each application (Fig. 1 elements 133 and 148), and

the notifying means notifies the OS unit of the application which requests the resource by notifying the OS unit of an application ID of the application, and notifies the OS unit of the application which is completed by notifying the OS unit of the application ID of the application (Fig. 1 elements 133 and 148).

21. As per claims 77-78, Bishop teaches the invention as claimed, including a computer-readable medium recording a program for use in the application execution apparatus of claims 58 and 62-63 (Fig. 1).

22. As per claim 79, Bishop teaches the invention as claimed, including a computer-readable medium recording a program for use in the application execution apparatus of claim 64 (Fig. 1).

23. As per claim 80, Bishop teaches the invention as claimed, including a computer-readable medium recording a program for use in the application execution apparatus of claim 71 (Fig. 1).

24. As per claim 81, Bishop teaches the invention as claimed, including an application execution apparatus for managing a memory heap area for applications which requires garbage collection, comprising:

application storing means for storing a plurality of applications (Fig. 1 element 104);

application executing means for reading each application in the application storing means, and executing the read application by generating a plurality of objects relating to the application and executing the plurality of objects (col. 2 lines 31-35; Fig. 1 element 110);

divided heap area acquiring means for acquiring, when the application executing means executes the application, a divided heap area in the memory heap area, the divided heap area being unique to the application (col. 3 lines 31-36);

allocation controlling means for, when the application executing means generates an object relating to the application, judging whether the object is allocable in the divided heap area acquired for the application (col. 3 line 63 - col. 4 line 5), allocating the object in the divided heap area if the judgment is affirmative (col. 4 lines 6-10, 29-34); and

locking means for, while the garbage collecting means is performing the garbage collection on the divided heap area, suspending the execution of only the application for which the divided heap area being garbage-collected is acquired (col. 4 lines 52-57).

25. Lawrence teaches the invention as claimed, including:

garbage collecting means for performing garbage collection in units of divided heap areas (col. 9 lines 20-36);

allocation controlling means for judging whether the object is allocable in the divided heap area acquired for the application, and instructing the garbage collecting means to perform garbage collection on the divided heap area and allocating the object in the divided heap area after the garbage collection if the judgment is negative (col. 7 lines 18-46); and

memory releasing means for releasing the divided heap area, when the application is completed (col. 8 line 61 - col. 9 line 10; col. 10 lines 17-30).

26. As per claim 82, Bishop teaches the invention as claimed, including the application execution apparatus of claim 81,

wherein the divided heap area acquiring means includes:

table holding means for holding a table showing a correspondence between applications being executed and divided heap areas acquired for the applications (Fig. 1 element 130).

27. Lawrence teaches the invention as claimed, including:

the memory releasing means specifies the divided heap area corresponding to the application based on the table in the table holding means, and releases the specified divided heap area (col. 8 line 61 - col. 9 line 10; col. 10 lines 17-30).

28. As per claim 83, Bishop teaches the invention as claimed, including the application execution apparatus of claim 81,

wherein the divided heap area assigning means includes:

table holding means for holding a table showing a correspondence between applications being executed and divided heap areas acquired for the applications (Fig. 1 element 130), and

when the application executing means executes the application, the allocation controlling means registers a correspondence of the application and the divided heap area acquired for the application, into the table in the table holding means (Fig. 1 elements 130 and 145).

29. As per claim 84, Lawrence teaches the invention as claimed, including the application execution apparatus of claim 81, further comprising:

system heap area allocating means for allocating the memory heap area as a system heap area (col. 1 lines 16-48; col. 6 line 62 - col. 7 line 10); and

object area acquiring means for acquiring a system-related object area in the system heap area (col. 1 lines 16-48; col. 6 line 62 - col. 7 line 10).

30. As per claims 85-92, Bishop teaches the invention as claimed, including a computer-readable recording medium recording a program for implementing the memory heap management method used in the apparatus of claims 81-84 (Fig. 1).

#### *Allowable Subject Matter*

31. Claims 67-69 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### *Response to Arguments*

32. Applicant's arguments with respect to claims 58-92 have been considered but are moot in view of the new grounds of rejection.

#### *Conclusion*

33. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

Art Unit: 2195

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J Ali whose telephone number is (571) 272-3769. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Syed Ali  
June 3, 2005



MENG-AI T. AN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2100